

1 1. A method comprising:
2 blanket depositing a mobility enhancing silicon
3 material over a region of a semiconductor substrate to form
4 amorphous and crystalline films; and
5 selectively removing an amorphous film without
6 substantially removing the crystalline film.

1 2. The method of claim 1 including blanket
2 depositing a material to enhance compressive strain.

1 3. The method of claim 1 including blanket
2 depositing a material to enhance tensile strain.

1 4. The method of claim 1 including blanket
2 depositing a carbon doped silicon material.

1 5. The method of claim 1 including blanket
2 depositing a boron doped silicon material.

1 6. The method of claim 1 wherein selectively
2 removing includes etching in the presence of sonication.

1 7. The method of claim 6 including etching using
2 tetramethylammonium.

1 8. The method of claim 6 including etching using
2 NH₄OH.

1 9. The method of claim 1 wherein blanket depositing
2 includes depositing using trisilane.

1 10. The method of claim 9 including depositing using
2 trisilane at a temperature less than 550°C.

1 11. The method of claim 1 including forming a
2 strained channel NMOS transistor.

1 12. The method of claim 1 including forming a
2 strained channel PMOS transistor.

1 13. The method of claim 1 including removing ion
2 implanted source/drain regions and blanket depositing a
3 mobility enhancing silicon material over said removed
4 source/drain regions and over gate electrode regions.

1 14. A semiconductor structure comprising:
2 a semiconductor substrate;
3 a gate structure formed over said substrate; and
4 a film of mobility enhancing material formed over
5 said substrate and said gate structure, said film being

6 amorphous over said gate structure and crystalline over
7 said semiconductor substrate.

1 15. The structure of claim 14 wherein said film is
2 carbon doped.

1 16. The structure of claim 14 wherein said film is
2 boron doped.

1 17. The structure of claim 14 wherein said film
2 includes trisilane.

1 18. The structure of claim 14, said substrate
2 including depressions, filled with said film, on either
3 side of said gate structure.

1 19. A method comprising:
2 removing implanted source/drain regions on either
3 side of a gate structure;
4 forming a crystalline film over said substrate
5 where said source/drain regions were removed; and
6 forming an amorphous film over said gate
7 structure.

1 20. The method of claim 19 including depositing a
2 carbon doped silicon material to form said amorphous and
3 crystalline films.

1 21. The method of claim 19 including selectively
2 removing the amorphous film without substantially removing
3 the crystalline film.

1 22. The method of claim 21 wherein selectively
2 removing includes etching in the presence of sonication.

1 23. The method of claim 22 including etching using
2 tetramethylammonium.

1 24. The method of claim 22 including etching using
2 NH_4OH .

1 25. The method of claim 19 wherein said films are
2 formed by depositing a silicon layer using trisilane at a
3 temperature less than 550°C.

1 26. A method comprising:
2 forming a film of mobility enhancing material
3 over a semiconductor substrate and over a gate electrode
4 structure; and

5 selectively etching the material over the gate
6 electrode structure without substantially etching the
7 material over the substrate.

1 27. The method of claim 26 including blanket
2 depositing said material to enhance compressive strain.

1 28. The method of claim 26 including blanket
2 depositing said material to enhance tensile strain.

1 29. The method of claim 26 wherein selectively
2 etching includes etching in the presence of sonication.

1 30. The method of claim 29 including depositing said
2 material using trisilane at a temperature less than 550°C.

1 31. The method of claim 26 including removing ion
2 implanted source/drain regions and blanket depositing a
3 mobility enhancing silicon material over said removed
4 source/drain regions and over gate electrode regions.

1 32. The method of claim 31 including depositing a
2 carbon doped silicon to form amorphous and crystalline
3 films.